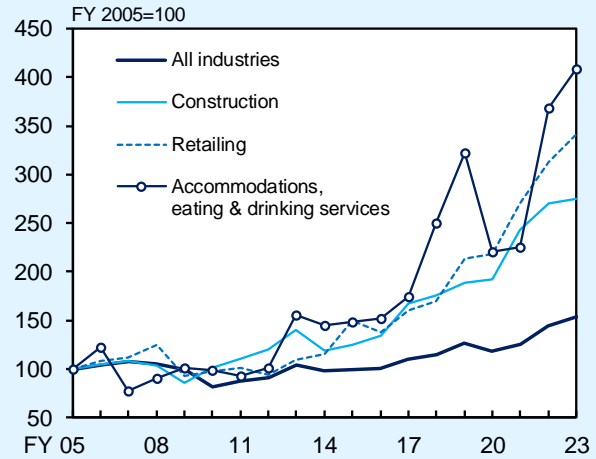


(Box 3) Labor Shortages and Business Fixed Investment

With labor market conditions in Japan continuing to tighten, wages have been under upward pressure. Given that labor shortages are expected to continue, firms have been moving ahead with labor-saving and efficiency-improving investments to replace labor with capital (machines).

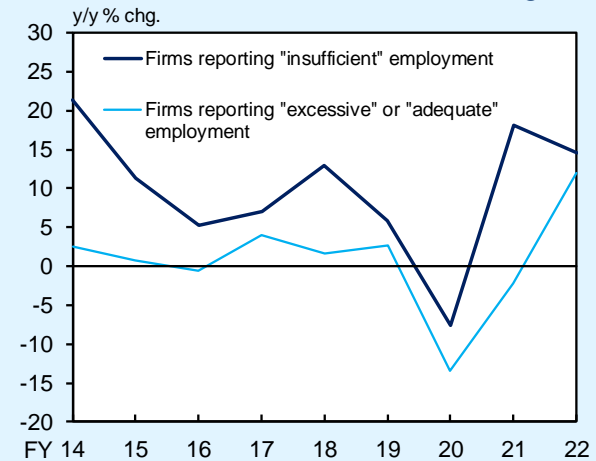
Labor-saving investment was already following an uptrend during the phase of economic recovery and labor shortages before the pandemic.²³ Recently, in the accommodations as well as eating and drinking services industries and the retailing industry, where labor shortages have been acute, firms' efforts to address this issue through the use of digital technology have been accelerating (Chart B3-1). Moreover, analyzing microdata from the *Tankan* surveys suggests the following. First, firms facing more acute labor shortages have been more active in making business fixed investment (Chart B3-2). Second, among such firms, the longer they have faced labor shortages, the more active they have tended to be in making such investment (Chart B3-3). Given these factors, since labor market conditions are highly likely to remain tight going forward, it can be said that there is large potential demand for labor-saving investment to address labor shortages, which is projected to underpin business fixed investment.

Chart B3-1: Software Investment



Source: Bank of Japan.
 Note: Based on the *Tankan*. All enterprises. The figures for fiscal 2022 and 2023 are forecasts from the March 2023 survey.

Chart B3-2: Investment Depending on Firms' Assessment of Labor Shortages



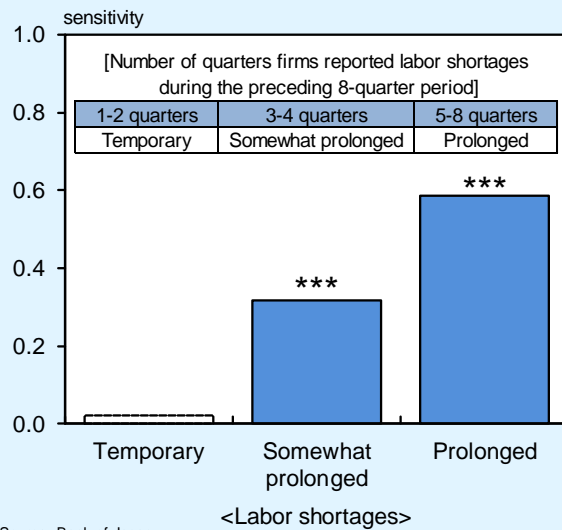
Source: Bank of Japan.
 Note: The chart shows business fixed investment (including software investment and excluding land purchasing expenses) aggregated based on firms' assessment of their employment level at the beginning of the fiscal year using microdata from the *Tankan*. The figures for fiscal 2022 are forecasts from the March 2023 survey.

²³ See, for example, Box 4 in the July 2018 Outlook Report.

That said, it should be noted that there are uncertainties over the size and pace at which such potential demand will materialize. The following points should also be kept in mind regarding future developments in business fixed investment.

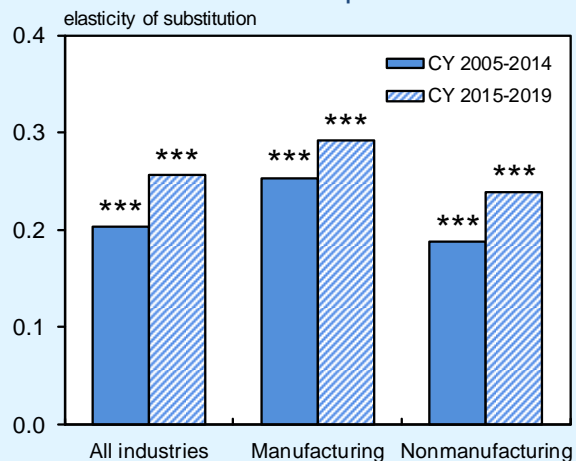
The first is whether labor-saving investment will be hampered by factors such as a lack of highly skilled personnel. Estimating the elasticity of substitution between labor and capital -- i.e., the degree to which changes in relative prices due to, for example, wage increases lead to substitution between the two -- shows that the elasticity has increased since the mid-2010s (Chart B3-4). This suggests that, with labor shortages intensifying, firms' efforts to make up for such shortages with capital have started to accelerate. That said, the elasticity estimates for Japan are lower than those for the United States obtained in preceding studies.²⁴ While there are various possible explanations, one likely reason is a lack of highly skilled personnel in Japan with sufficient skills to develop and use labor-saving software. In fact, the *Tankan* shows that firms' actual software investment recently has been falling far short of their plans as a trend, suggesting the possibility that firms have been unable to make as much progress with digitalization as they had planned (Chart B3-5).

Chart B3-3: Labor Shortages and Business Fixed Investment



Source: Bank of Japan.
 Note: The results are based on panel estimation using microdata from the *Tankan*. The dependent variable is the ratio of business fixed investment to sales. Explanatory variables are as follows: dummy variables for the number of quarters firms reported that they had "insufficient" employment during the preceding two-year period as well as firms' assessment of their business conditions, production capacity, and financial positions. The estimation period is from fiscal 2008 to 2021. *** indicates that the results are statistically significant at the 1 percent level, while the broken line indicates that the result is not statistically significant.

Chart B3-4: Elasticity of Substitution between Labor and Capital

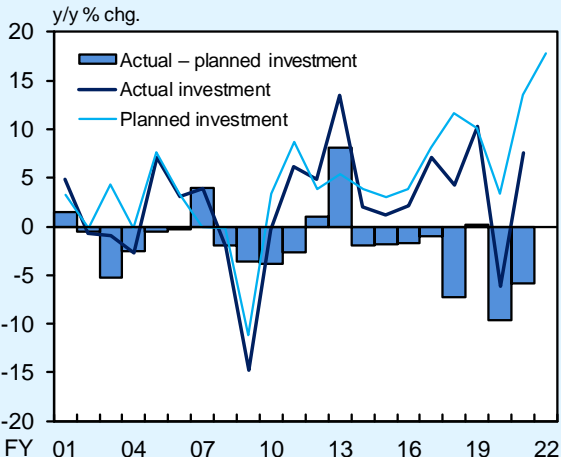


Source: Cabinet Office.
 Note: Figures are estimated from the capital intensity and the relative price of capital to labor using industry-level panel data (manufacturing: 7 industries; nonmanufacturing: 9 industries; all industries: 16 industries). The legend shows the estimation periods. *** denotes statistical significance at the 1 percent level.

²⁴ See, for example, Knoblach, M., Roessler, M., and Zwerschke, P., "The Elasticity of Substitution between Capital and Labour in the US Economy: A Meta-Regression Analysis," *Oxford Bulletin of Economics and Statistics* 82, no. 1 (2020): 62-82. The study examines the estimates of the elasticity of substitution between labor and capital in the United States obtained in preceding studies. The median of the estimates is around 0.7, but it should be noted that, since estimates differ across studies, such comparisons need to be interpreted with considerable latitude.

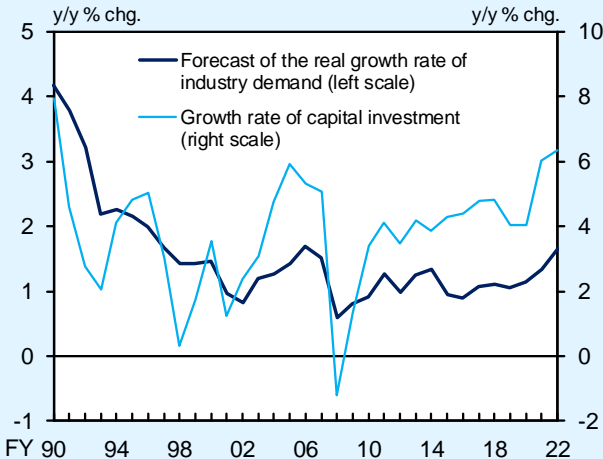
The second point to keep in mind is whether firms' medium- to long-term growth expectations will hold up. If the declining population, which is one of the reasons for labor shortages, leads firms to expect the domestic market to stagnate, this may push down business fixed investment, including labor-saving investment. That said, at least among large firms, forecasts of the medium- to long-term growth rate of industry demand have followed an improving trend, and the growth rate of planned medium-term investment has been at its highest level in about 30 years (Chart B3-6). Moreover, business fixed investment plans for fiscal 2023 in the *Tankan* indicate that investment this fiscal year is likely to be at a high level. Firms therefore appear to be planning to invest actively to, for example, capture global demand and make efforts toward decarbonization and digitalization.

Chart B3-5: Planned and Actual Software Investment



Source: Bank of Japan.
 Note: Based on the *Tankan*. All industries and enterprises. Figures for planned investment are as of the December survey of each year.

Chart B3-6: Annual Survey of Corporate Behavior



Source: Cabinet Office.
 Note: The chart shows the average of firms' forecasts of the real growth rate of industry demand over the next five years and of the growth rate of firms' planned capital investment over the next three years.